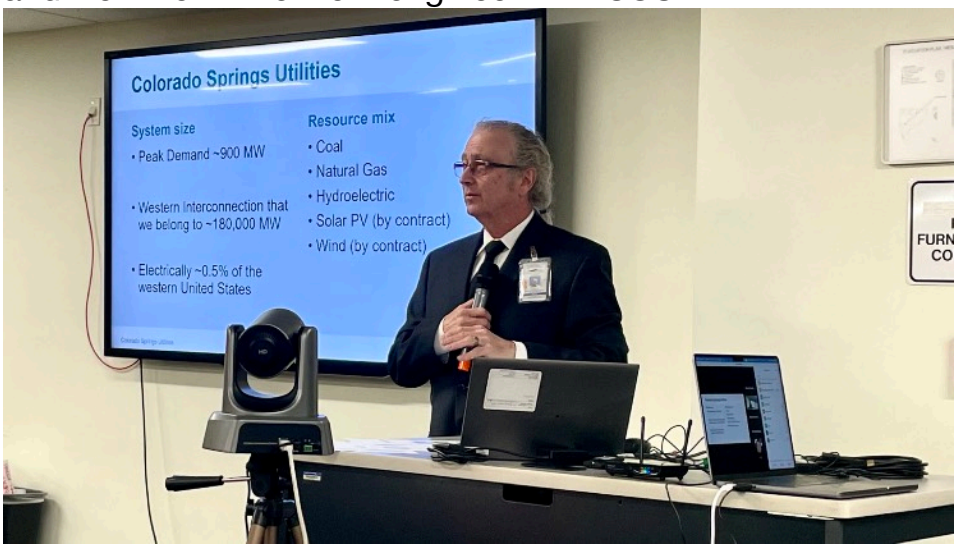
Pike Solar Array Presentation and Site Tour

On May 15 at 6:30 pm, the IEEE Pikes Peak Section in conjunction with it's Power & Engineering Society Chapter held a hybrid presentation on the Pike Solar Array at the Colorado Springs Utilities facility on Mesa Road in Colorado Springs. The event was co-hosted by Foothills and Baltimore PES Chapters and the Denver Life Member Affinity Group.

Our speaker was Steve Schaarschmidt, PE, Principal Transmission Operations and Downtown Network engineer with CSU.



The in-person meeting was attended by 21 people from the Pikes Peak Section. A Pizza dinner was served and there was some networking time following the talk. Our host for the event was Birgit Landin of the CSU Customer Relations department. We had 8 people joining the meeting on-line.

The Pikes Solar Array is located south of Colorado Springs and east of the Nixon Power Plant which houses major CSU coal and natural gas power facilities. As we go east from I-25, we see the Palmer Solar Array (60 MW) which was completed in 2020 and then the Pike Solar Array which went on-line this year. The Pikes Solar Array occupies 1300 acres and has about 415K solar panels with 545 watts per panel. The gross power of the facility is 223.6 MW but after internal losses has a peak power output of 175MW. The solar panels rotate from east to west to track the sun during the day. Grid-following inverters synchronize the array output with the system frequency and phase during operation. The solar array generates 600 volt output that is up-converted to 34.5 KV and sent to a substation where it is up-converted to 120 KV. Steve said that the array operates at about 20% average power efficiency when effects of darkness and weather are factored in. CSU currently is producing more than 20% renewal energy to meet state mandates. This power comes from Solar, Wind, and Hydro (35MW) sources. Overall CSU peak demand was stated as about 900 MW. Steve explained that this represented only about 0.5% of the power demand in the Western US grid which CSU is a part. It's demand is 180 GW!

Pike Solar Array Site Tour - May 16

February 13, 2024 - JUWI has brought the largest PV project in JUWI history online: With an output of 223.6 megawatts, JUWI has built a solar park for the energy company Deriva (formerly Duke Energy). The “Pike Solar” solar farm will supply energy to the regional American energy supplier Colorado Springs Utilities (CSU) under a 17-year power purchase agreement.

https://www.juwi.com/news/press-releases/articles/record-breaking-solar-park-from-the-juwi-group

On May 16, a group of 8 people gathered at the Operations and Maintenance Office and were given hard hats and safety glasses.

We learned that 1300 sheep graze under the solar panels to keep the grass down.

Each solar panel which is about 1 meter by 2 meters contains 144 solar cells. There are about 30 solar panels mounted on a rotating pole. The panels are series connected to create a 600 volt output.

There is a motor mounted between several rows of panels. This single motor rotates the panels from directly east to directly west during the day. Sun position sensors determine the correct angle to maximize solar output. We learned that the panels are rated at greater than 120 mph wind speed but they must be rotated to specific angles during a high wind event to prevent damage. We also learned that the panels are susceptible to hail damage. We heard that 5000 panels were damaged by hail during installation (of over 415K panels). During operation, panels are rotated to a correct angle to minimize hail damage when a hail storm is predicted. There are 690 of these motors in the Pike Solar Array.

The top black wires below the motor are for motor control. The bottom red and black cables are 600 volt outputs connected to the circuit breaker box from the rows.

The 600 volt cables terminate in circuit breaker box to allow rows to be isolated for installation and repair. The box outputs to the grid following inverters.

Here is the large grid-following inverter. It receives the 600 volt inputs from multiple rows of the array, convert from DC to AC voltage and up-converts this voltage to 34.5KV which is sent to a power substation nearby via buried high voltage cables. There are a total of 96 of these inverters in the overall Pike Solar Array.

After seeing the basic functional parts of the array, the group headed for the substation nearby that handles this field of panels. Several fields of panels make up the overall Pikes Solar Array.

The buried 34.5KV lines from the field of solar panels come out of the ground and are connected to large circuit breakers (the grey boxes).

The outputs from these circuit breakers is connected to a transformer which up-converts 34.5KV to 120KV which connects the field to a nearby CSU substation which consolidates all of the solar field outputs and send the power to Colorado Springs via two major transmission lines.

The Site Tour Group is shown in front of a row of Solar Panels. Our Juwi hosts are shown with orange vests. Our tour host from CSU, Brittany Harrison is shown in purple shirt. Our speaker from CSU, Steve Schaarschmidt, is shown fourth from the left. The IEEE Pikes Peak Section appreciates the support of CSU and Juwi to make this 2-day event possible.